

## Product Summary

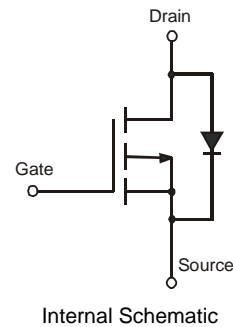
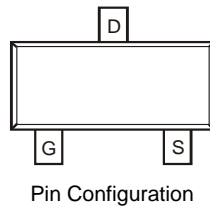
$V_{(BR)DSS}$	$R_{DS(on) \max}$	$I_D$ $T_A = +25^\circ\text{C}$
-20V	95m $\Omega$ @ $V_{GS} = -4.5\text{V}$	3.0A
	130m $\Omega$ @ $V_{GS} = -2.5\text{V}$	2.5A

## Description

This new generation MOSFET has been designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

- DC-DC Converters
- Power Management Functions
- Analog Switch



## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 standards for High Reliability**

## Mechanical Data

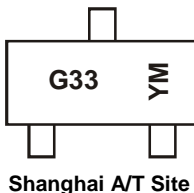
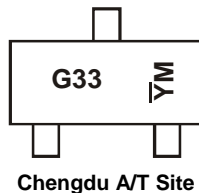
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.0072 grams (approximate)

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMG3413L-7	SOT23	3,000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



G33 = Marking Code  
 YM = Date Code Marking for SAT (Shanghai Assembly/ Test site)  
 ȲM = Date Code Marking for CAT (Chengdu Assembly/ Test site)  
 Y or Ȳ = Year (ex: A = 2013)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
Code	X	Y	Z	A	B	C	D	E	F

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

**Maximum Ratings** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	$P_D$	0.7	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	184	$^\circ\text{C/W}$
	$t < 10\text{s}$	115	
Total Power Dissipation (Note 6)	$P_D$	1.3	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	94	$^\circ\text{C/W}$
	$t < 10\text{s}$	61	
Thermal Resistance, Junction to Case	$R_{\theta JC}$	25	
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Value	Units	
Drain-Source Voltage	$V_{DSS}$	-20	V	
Gate-Source Voltage	$V_{GSS}$	$\pm 8$	V	
Continuous Drain Current (Note 6) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	3.0	A
		$T_A = +70^\circ\text{C}$	2.4	
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$	3.7	A
		$T_A = +70^\circ\text{C}$	2.9	
Continuous Drain Current (Note 6) $V_{GS} = -2.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	2.5	A
		$T_A = +70^\circ\text{C}$	2.0	
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$	3.2	A
		$T_A = +70^\circ\text{C}$	2.5	
Maximum Continuous Body Diode Forward Current (Note 6)	$I_S$	1.9	A	
Pulsed Drain Current (10 $\mu\text{s}$ pulse, duty cycle = 1%)	$I_{DM}$	20	A	

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	-20	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	-1.0	$\mu\text{A}$	$V_{DS} = -16\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 8\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	-0.6	-0.55	-1.3	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	73	95	m $\Omega$	$V_{GS} = -4.5\text{V}, I_D = -3.0\text{A}$
			95	130		$V_{GS} = -2.5\text{V}, I_D = -2.6\text{A}$
			146	190		$V_{GS} = -1.8\text{V}, I_D = -1\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	—	8	-	S	$V_{DS} = -5\text{V}, I_D = -3\text{A}$
Diode Forward Voltage	$V_{SD}$	—	-0.8	-1.25	V	$V_{GS} = 0\text{V}, I_S = -1\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	$C_{iss}$	—	857	—	pF	$V_{DS} = -10\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	54	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	49	—	pF	
Gate Resistance	$R_g$	—	12.3	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge	$Q_g$	—	9.0	—	nC	$V_{GS} = -4.5\text{V}, V_{DS} = -15\text{V}, I_D = -4\text{A}$
Gate-Source Charge	$Q_{gs}$	—	1.6	—	nC	
Gate-Drain Charge	$Q_{gd}$	—	1.1	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	9.7	—	ns	$V_{DS} = -15\text{V}, V_{GS} = -10\text{V},$ $R_L = 15\Omega, R_G = 6.0\Omega, I_D = -1\text{A}$
Turn-On Rise Time	$t_r$	—	17.7	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	268.8	—	ns	
Turn-Off Fall Time	$t_f$	—	64.2	—	ns	

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1inch square copper plate
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

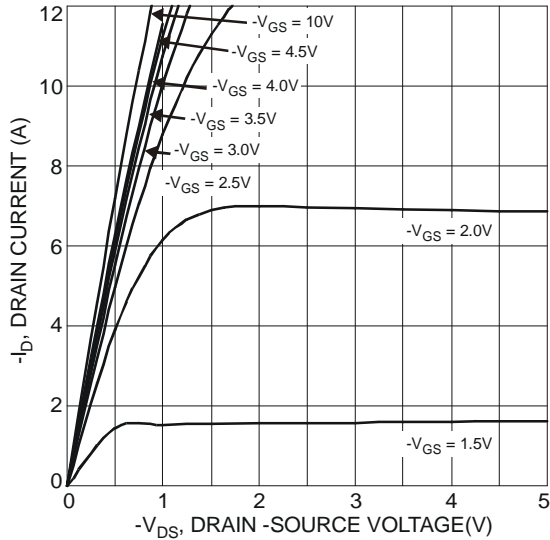


Fig. 1 Typical Output Characteristics

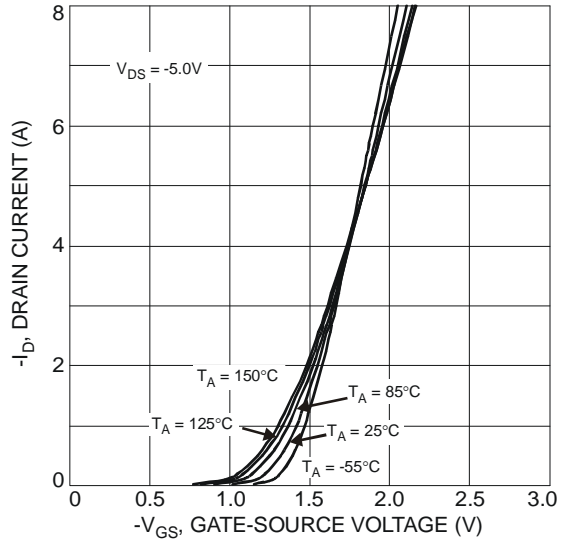


Fig. 2 Typical Transfer Characteristics

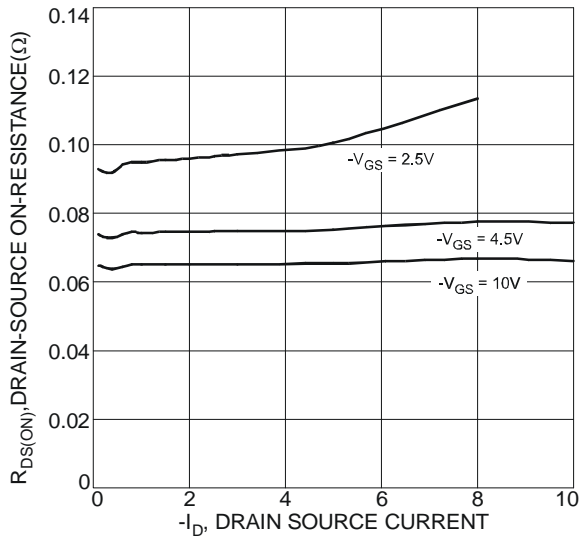


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

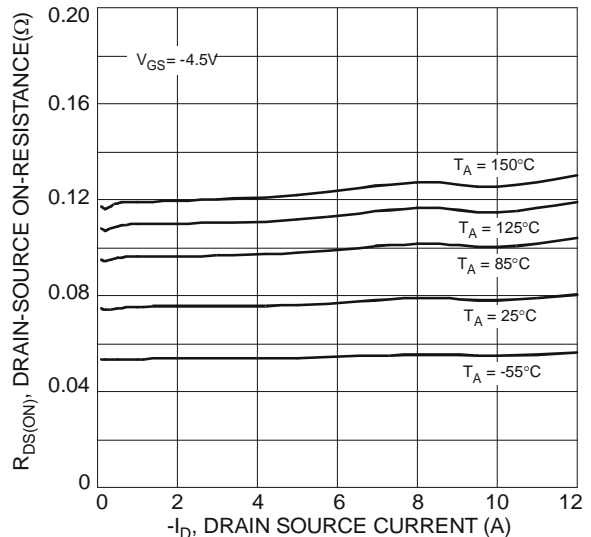


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

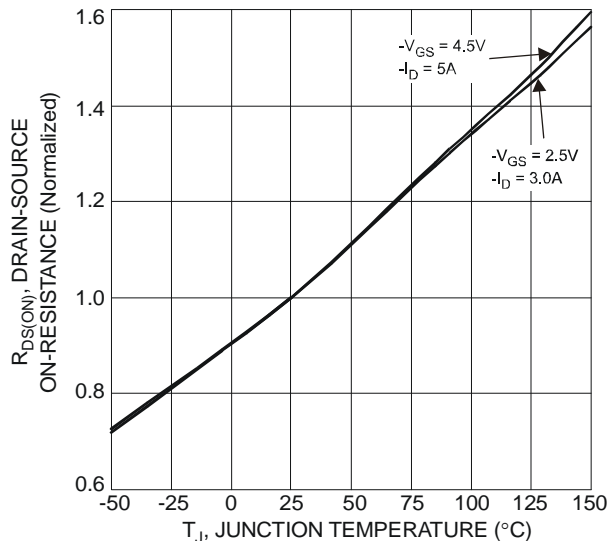


Fig. 5 On-Resistance Variation with Temperature

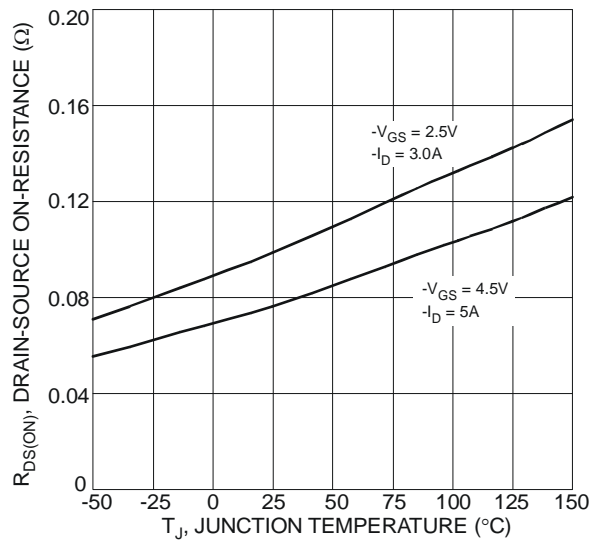


Fig. 6 On-Resistance Variation with Temperature

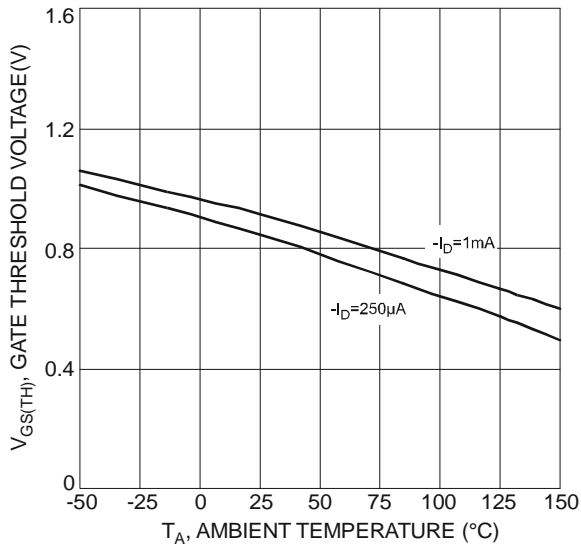


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

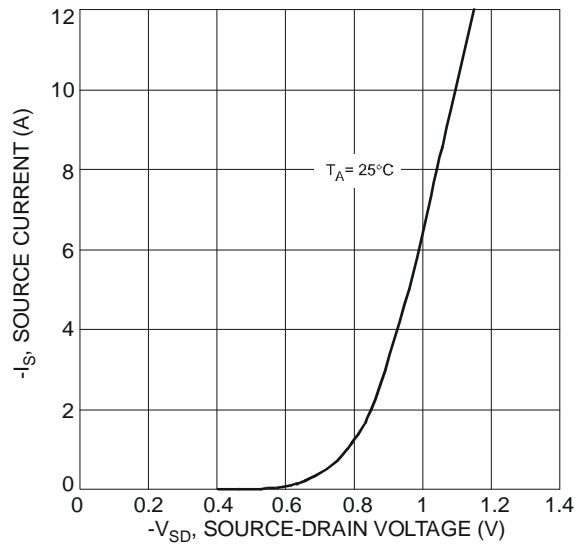


Fig. 8 Diode Forward Voltage vs. Current

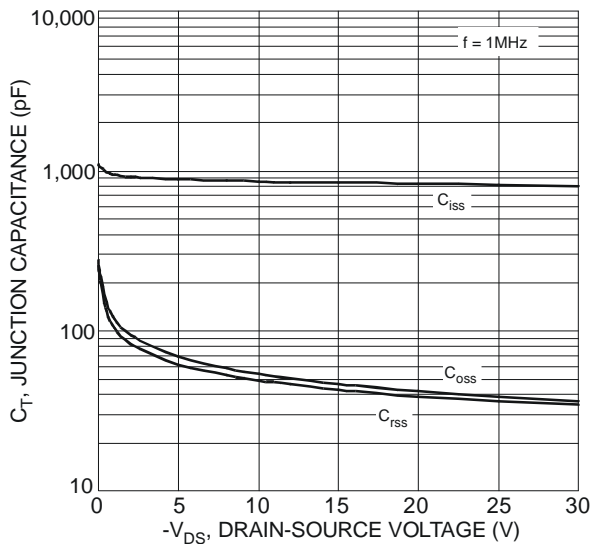


Fig. 9 Typical Junction Capacitance

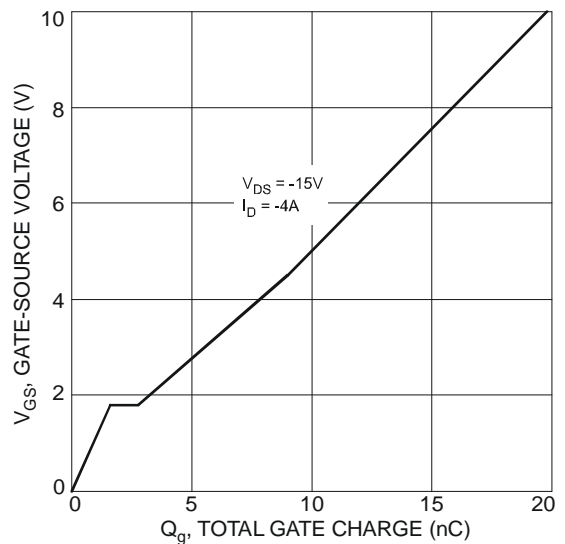


Fig. 10 Gate-Charge Characteristics

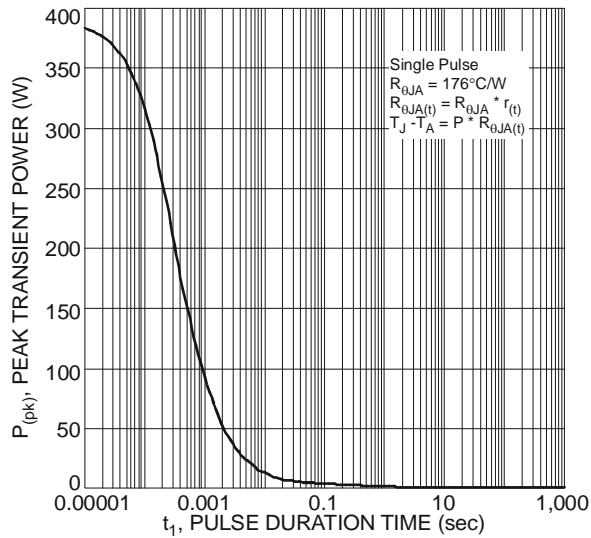


Fig. 11 Single Pulse Maximum Power Dissipation

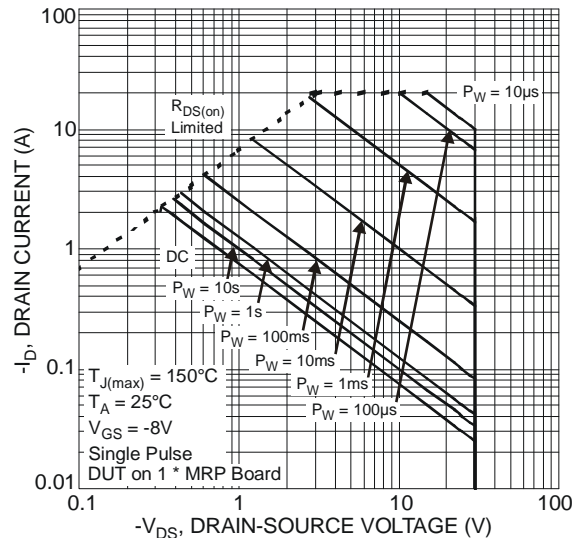


Fig. 12 SOA, Safe Operation Area

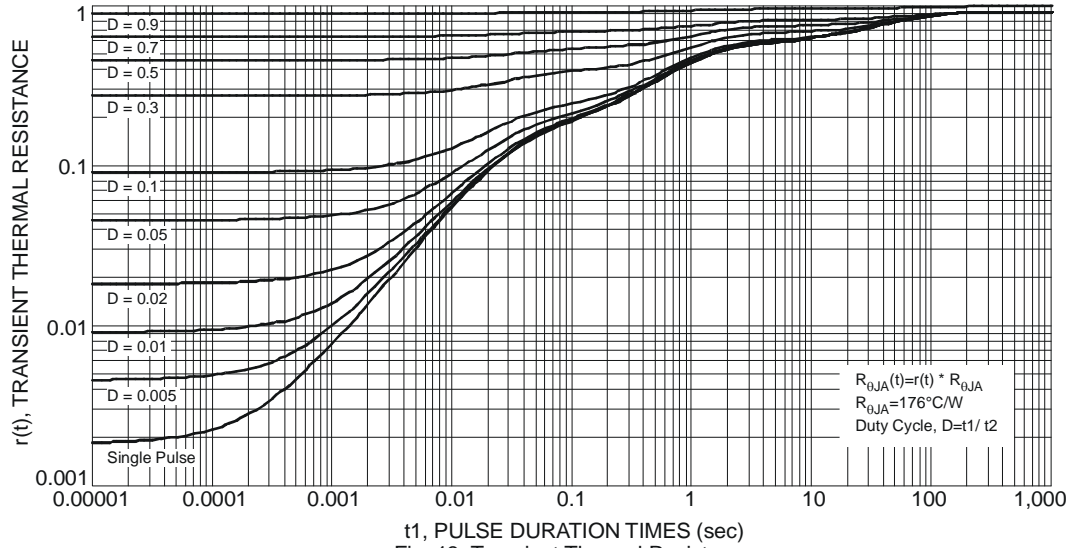
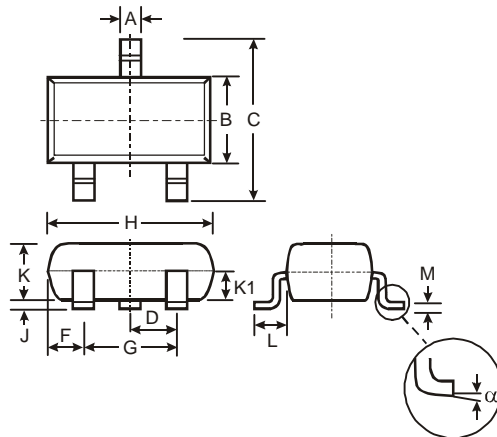


Fig. 13 Transient Thermal Resistance

**Package Outline Dimensions**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

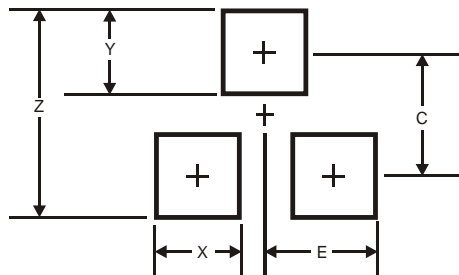


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
$\alpha$	0°	8°	-

All Dimensions in mm

**Suggested Pad Layout**

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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